Foothills Fire and Biota Project

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• To minimise the impact of major bushfires on human life, communities, essential and community infrastructure, industries, the economy and the environment. Human life will be afforded priority over all other considerations.

• To maintain or improve the resilience of natural ecosystems and their ability to deliver services such as biodiversity, water, carbon storage, and forest products.
Resilience measures
- Growth stage distribution
- Tolerable Fire Intervals
- Geometric Mean Abundance
Recent fire ecology research projects

- Mallee Fire and Biodiversity/Mallee Hawkeye
- Foothills Fire and Biota
- Fire and Carbon Project
- Faunal Refuges Project
- Fire in Wet Forests
- Gippsland Hawkeye
- Otways Hawkeye
- Fire, landscape pattern and biodiversity
- Wet Forest Fuels and Hazard
- Effects of fire regimes on terrestrial biodiversity (Retro)

Foothills Fire and Biota Project
Foothills Forest

- ‘Messmate-peppermint forest’
- Extensive complex of vegetation types
Foothills Forest

• Bio-diverse
• Large wildfires, complex range of fire regimes
• Bushland-urban interface
• Treatable with planned burning

Photo: Steve Platt
Project aim

“To provide models of the relationships of biota to fire history and landscape patterns that can be used to assist in the prediction of the biodiversity outcomes of bushfire and planned burns in Foothills Forest”. 
Collaborative approach

- ARI
- Deakin University
- La Trobe University
- University of Melbourne
- DELWP
Data sets

- Wealth of foothill forests data (400+ sites)
- Evaluation and collation of data sets a major task
## Data sets

Number of samples available for analyses for biotic groups and features.

<table>
<thead>
<tr>
<th>Biotic group/feature</th>
<th>Number of samples*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals (Elliott trapping)</td>
<td>367</td>
</tr>
<tr>
<td>Mammals (camera trapping)</td>
<td>919</td>
</tr>
<tr>
<td>Mammals (spotlighting)</td>
<td>285</td>
</tr>
<tr>
<td>Birds</td>
<td>1822</td>
</tr>
<tr>
<td>Flora</td>
<td>808</td>
</tr>
<tr>
<td>Vegetation structure/habitat</td>
<td>393</td>
</tr>
<tr>
<td>Tree attributes (dbh, density etc.)</td>
<td>554</td>
</tr>
<tr>
<td>Litter</td>
<td>535</td>
</tr>
<tr>
<td>Fuel load/hazard</td>
<td>343</td>
</tr>
</tbody>
</table>

*Includes repeat surveys within sites
## Species response modelling

Response and predictor variables used in analyses.

<table>
<thead>
<tr>
<th>Project component</th>
<th>Response variables</th>
<th>Predictor variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire/environment models</td>
<td>Fauna</td>
<td>Fire history</td>
</tr>
<tr>
<td></td>
<td>Flora</td>
<td>Fire history</td>
</tr>
<tr>
<td></td>
<td>Vegetation structure</td>
<td>Landscape (e.g. vegetation type, topography)</td>
</tr>
<tr>
<td></td>
<td>Habitat</td>
<td>Context</td>
</tr>
<tr>
<td></td>
<td>Fuel</td>
<td>(vegetation/fire history mosaic)</td>
</tr>
<tr>
<td></td>
<td>Species distributions</td>
<td>Climate</td>
</tr>
<tr>
<td>Habitat models</td>
<td>Fauna</td>
<td>Habitat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vegetation structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Landscape</td>
</tr>
</tbody>
</table>

### Graph (a)

(a) Probability of occurrence vs. time since fire (years)

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Species response modelling

Birds

Plants
Optimisation

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Optimisation

Birds with fire response (Forby) GMA = 0.28

Birds with fire response (Forby) GMA = 0.24

Birds with fire response (Forby) GMA = 0.23

Birds with fire response (Forby) GMA = 0.25

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Spatially explicit simulations

- Collaboration with ECBRL team
- Project models onto fire landscapes
Spatially explicit simulations

Year 0

Year 20

Year 40

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Spatially explicit simulations

Growth stages
- Juvenile (0 – 3 years)
- Adolescent (4 – 10 years)
- Mature (11 – 40 years)
- Stasis (41 + years)

Scenario 1

Scenario 2

Scenario 3

Scenario 4

Foothills Fire and Biota Project
Spatially explicit simulations

<table>
<thead>
<tr>
<th>Growth stage distribution under scenarios</th>
<th>GMA birds</th>
<th>GMA plants</th>
<th>GMA all species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foothills Forest</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimum growth stage distribution</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Growth stages**
- Juvenile (0 - 3 years)
- Adolescent (4 – 10 years)
- Mature (11 – 40 years)
- Stasis (41 + years)

**Optimum GMA**

**Calculated GMA**

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Conclusions

- Resilient system?
- Caveats
- Implications for fire management
Lessons learnt

- Power/limitations of past large data sets
- Time taken to curate data
- Value of well designed data collection (including fire mapping)
- Benefits of collaborative approach